PONY

سلسلة كتب الأستاذ

ICT

Final Revision

Part 2

By

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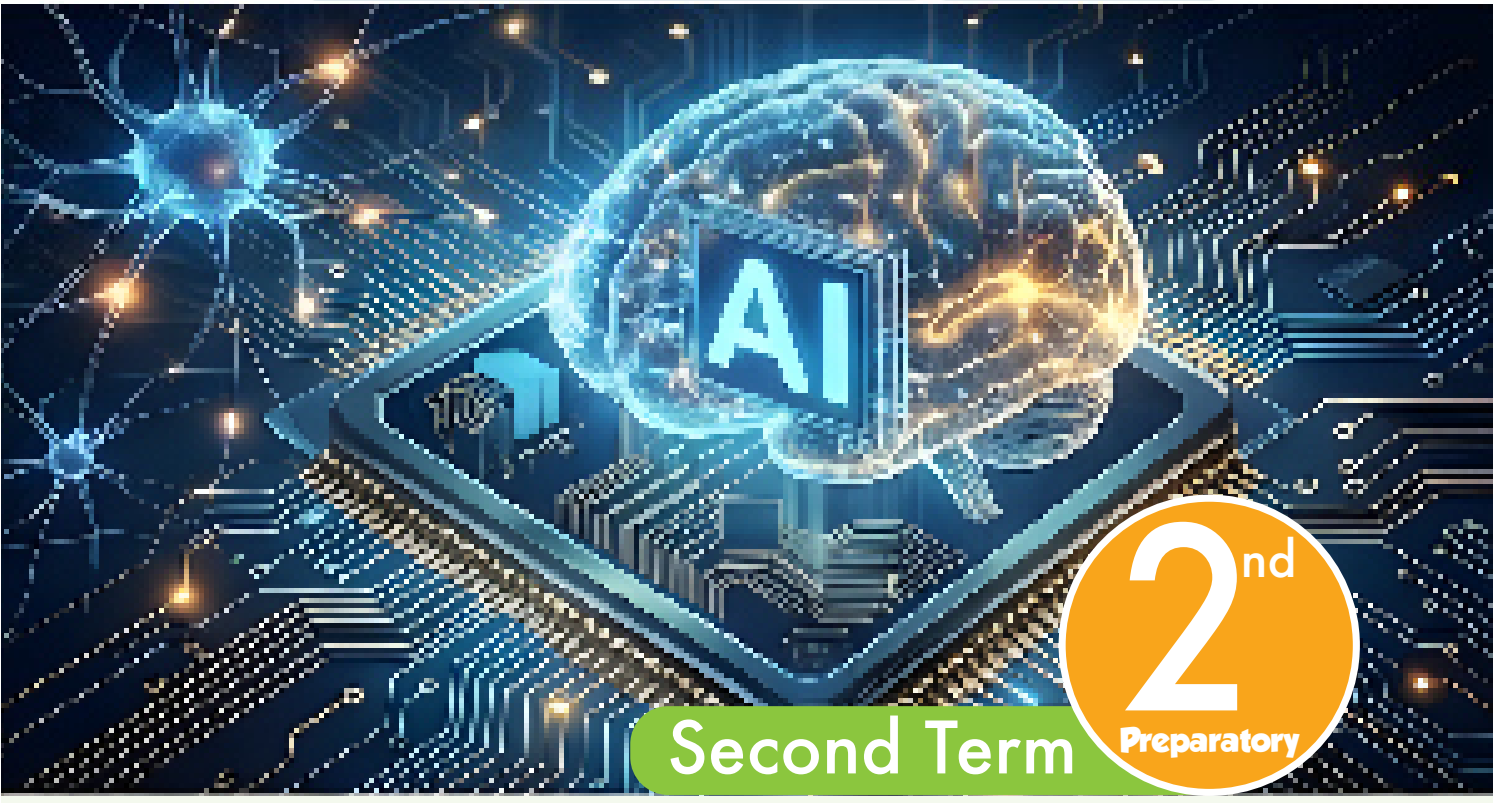

Second Term

2nd Preparatory

Summary

Lesson 1

- To analyze data in Python, we use specific libraries to read, process, and visualize Excel files using the following commands:
  - pip install pandas: It installs Pandas library for data analysis and reading Excel files.
  - pip install matplotlib : It installs matplotlib library for creating graphs.
- File Requirement: An Excel file (grades.xlsx) must exist in the same folder of the program.
- We use the Pandas library to bring the data into our program.
- The Code Explanation:

Code	Function
import pandas as pd	It imports pandas library, which helps us deal with data and tables.
df= pd.read_excel('grades.xlsx')	It reads data from a file "grades.xlsx" and stores it in a variable called df.
print(df.head())	It displays the first 5 rows of the Excel file.

- Basic Data Analysis:

  Once the data is loaded, we can perform statistical analysis on specific subjects:
  - Mean: grades.mean(): It calculates the average.
  - Max: grades.max(): It finds the highest score.
  - Success Count: (grades > 13).sum(): It counts students above a threshold.
- Visualization:
  - kind='bar': It creates a bar chart.
  - kind='pie': It creates a pie chart.
  - plt.show( ): It's always added after each plot to display it.

- Correlation (corr()): It measures the relationship between subjects.
  - 1: Strong positive (both go up).
  - 0: No relationship.
  - -1: Inverse relation

Lesson 2

- Concept and Usage:
  - In Python, conditional statements are used to make logical decisions by running code only if a condition is True.
- General Syntax:
  - if condition: # If the condition is True, execute this code.
  - else: # Otherwise, execute this code instead.
- Types of Conditional Statements:

1. Simple IF: It executes a code for one specific possibility.

```
Age = 18
if age >= 18:
print("Allowed to enter")
```

2. IF... ELSE: It chooses between two different paths (if the first fails, the second runs).

```
age = 16
if age > = 18:
   print("Allowed to enter")
else:
   print("Sorry, you cannot enter") # This line runs because
   16 is less than 18
```

3 IF... ELIF... ELSE: It checks multiple conditions in sequence. It stops as soon as it finds a true one.

```
mark = 85
if mark >= 90:
   print("Excellent")
elif mark >= 75:
   print("Very Good")  # This line runs because 85 is >= 75
elif mark >= 60:
   print("Good")
else:
   print("Fail")
```

Lesson 3

1 Loops:

» Loops help you repeat a specific task many times without rewriting the same code many times.

A) The for Loop:

- It's used when you know exactly how many times you want to repeat the code.

```
for i in range(5):
    print("Hello!")              # This will print "Hello!"  5 times
```

- range(5) starts at 0 and goes up to 4 (total of 5 iterations).

B) The While Loop:

- It repeats the code as long as a condition is True.

```
x = 0
while x < 3:
   print("I am learning!")
   x += 1  # Increment x
```

- Warning: You must include an increment (like x += 1) to avoid an Infinite Loop.

2 Functions

- We create functions using the def keyword.
- The function does not work until we call it!
- Some functions have parameters, which are inputs passed into the function to make it flexible.
- print( ): It shows the result on the screen.
- return: It sends the value back to the program to be saved in a variable.

Python - Prep2

```
1. def add(a, b):
2.     result = a + b
3.     print(f" The sum is: {result}")
4.
5. add(3, 5)
```

Lesson 4

1 What are Data Structures?

- Data Structures in Python are ways to organize and store multiple pieces of data.
- You can think of them as specialized containers for different types of information.

Structure	Syntax	Usage	Notes
List	[ ]	Shopping lists, scores (can append, remove, sort).	Modifiable
Tuple	( )	Constant data like days of the week or coordinates	Fixed
Dictionary	{ }	Fast access by unique keys (e.g., student records)	Key-Value pairs

Main Operations:

Operation	Code	Explanation
Add	grades. append(95)	It adds a new grade.
Delete	grades. remove(78)	It deletes a specific grade.
Sort	grades. sort	It sorts items in order.

Lesson 5

Cryptography: It's the art of converting readable (Plaintext) into unreadable (Ciphertext) form.

Uses:

- Correct use: WhatsApp, HTTPS
- Wrong use: Ransomware

Key Functions:

- ord(): It converts character into Unicode Number (e.g., 'A' ⟶ 65).
- chr(): It converts Number into Character (e.g., 65 ⟶ 'A').

Encryption Methods:

1. Simple Encryption (Caesar Cipher):
   - It shift letters by a specific number.
   - Encryption: Original Code + Key = Encrypted Code.
   - Decryption: Encrypted Code - Key = Original Code.
2. Complex Encryption (AES):
   - It uses complex mathematical equations and very long keys.
   - This is used by banks and major corporations.

Lesson 6

Bitwise Operations:

- They are the fastest and most professional way a computer processes data.
- They are mathematical rules performed directly on these 1s and 0s.

Bit: It's the smallest unit of data (1 or 0).

The XOR Operator (^)

- Outputs 1 if inputs are different.
- Outputs 0 if inputs are the same.

The Reversible Secret: XOR is used for professional encryption because applying the same key twice returns the original message.

- Step 1: Message ^ Key = Ciphertext
- Step 2: Ciphertext ^ Key = Message

Final Revision - Part 2

Model Exam 1

1 Choose the correct answer:

1. Bitwise operations are important because they .....
   a. are a basic part of how computers make decisions and operations
   b. Work on words only
   c. Are not used in modern applications
   d. Are limited to games only
2. What is meant by Data Structures?.....
   a. Ways to beautify program shape
   b. Ways to execute loops only
   c. Ways to store data in program in an organized manner
   d. Commands to print texts
3. Bitwise operations are: .....
   a. Operations performed on 0s and 1s inside the computer
   b. Operations performed directly on words
   c. Operations performed on images only
   d. Slow and complex operations
4. Which of the following types is used in banks and companies to ensure maximum security?
   a. Simple Encryption b. Complex Encryption
   c. Manual Encryption d. Shift Encryption
5. What type of data can be analyzed using NLP?
   a. Numerical data. b. Images. c. Texts. d. Dates only
6. Which of the following is used to display the chart?
   a. plt.show(). b. plt.start(). c. plt.run(). d. plt.open().
7. Which of the following is used to write a Dictionary.....?
   a. [ ]. b. ( ). c. { }. d. <>

2 Put (✓) or (×):

1. The XOR operation is used only for text and does not work on numbers. ( )
2. Encryption is not used in daily applications like WhatsApp or banks. ( )
3. Python language does not contain libraries to support data analysis. ( )
4. The pandas library is used to read Excel files and analyze data. ( )
5. plt.show( ) does not display the chart. ( )
6. The chr ( ) function in Python converts a number to its corresponding character in the Unicode table. ( )
7. The ord ( ) function converts a character into a number. ( )
8. Dictionary is suitable for storing student data because it is organized and clear. ( )

Model Exam 2

1 Choose the correct answer:

1. The secret key used in encryption should .....
   - a. be changed at every step
   - b. Be the same for both encryption and decryption
   - c. Not be used in decryption
   - d. Be a letter only
2. Which of the following is considered a wrong use of encryption?
   - a. Securing accounts
   - b. Encrypting data for protection
   - c. Securing websites
   - d. Ransomware
3. A feature of XOR that makes it suitable for encryption is: .....
   - a. It completely changes the data format.
   - b. It is irreversible.
   - c. It is a reversible process used for both encryption and decryption
   - d. It works only on text

4 Which of the following uses square brackets?.....
a. Tuple b. Set c. Dictionary d. List

5 Which library is used for graphical visualizations in Python?
a. Pandas. b. NumPy. c. Matplotlib. d. Datetime.

6 What is the command used to load an Excel file?
a. pd.load_file(). b. pd.read_excel().
c. pd.open(). d.pd.read().

7 The code inside a function must be .....
a. Written after (;). b. Without indentation.
c. Written with indentation. d. Inside parentheses

2 Put (✓) or (×):

1 Bitwise operations are the basis of encryption and pattern discovery inside the computer. ( )

2 Decryption by shifting is done using the subtraction process. ( )

3 Simple encryption like Caesar Cipher is still used to protect major banks. ( )

4 The function np. mean () is used for cleaning and processing data. ( )

5 The head() function displays the entire table data. ( )

6 The else statement can be written without a preceding if-statement. ( )

7 In Python, a condition must end with a semicolon (;). ( )

8 Tuple uses braces {}. ( )

Model Exam 3

1 Choose the correct answer:

1 We use Tuple when we want data that .....
a. Changes constantly b. Fixed and does not change
c. Is deleted automatically d. Depends on keys and values

2 Which of the following is considered a correct use of encryption?

a. Protecting messages and passwords

b. Spreading viruses

c. Demanding ransom

d. Deleting data

3 If we do not change the condition inside a while loop, it may cause .....:

a. Immediate stop

b. An infinite loop

c. System error

d. Only one iteration

4 The XOR operation results in 1 when: .....

a. Both values are the same

b. Both values are different

c. Both values are zero only

d. Both values are one only

5 The function of chr () is .....

a. deleting characters

b. converting a character into a number

c. converting a number into a character

d. encrypting text

6 A while loop continues executing as long as .....

a. The number of repetitions is known.

b. The condition is true.

c. The number of repetitions = 0.

d. The condition is false.

7 The function of chr () is .....

a. deleting characters

b. converting a character into a number

c. converting a number into a character

d. encrypting text

2 Put (✓) or (×):

1. The secret key should not be the same during decryption. ( )
2. In shift encryption, a fixed value is subtracted to produce the ciphertext. ( )
3. The return function is used only to display the result on the screen. ( )
4. Wrong use of encryption includes encrypting files and demanding money to unlock them. ( )
5. Python language can be used to analyze date and time data. ( )
6. The grades.max () command calculates the average of students' grades. ( )
7. The code inside if-statement must be indented by only one space. ( )
8. The if-statement is used to make a decision based on a condition. ( )

Model Exam 4

1 Choose the correct answer:

1. The XOR operation in Python is performed using the symbol: .....
   a. + b. * c. & d. ^
2. Lists are characterized by being.....
   a. Fixed and immutable
   b. Written with parentheses ( )
   c. Mutable (adding and deleting items)
   d. Cannot store more than one data type
3. Shift encryption relies on .....
   a. adding a fixed value to the character's number
   b. swapping words
   c. subtracting a random number
   d. changing the order of sentences

4 Ciphertext is: .....

a. The original text
b. Text readable for all
c. Text without a key
d. encrypted text

5 The else statement is used when

a. The condition is always true
b. There is no condition
c. We want to execute alternative code when the condition is not met.
d. We want to define a variable.

6 Dictionary stores data in the form of.....

a. List inside list
b. Values only without keys
c. Key - Value
d. Unordered items

7 A for loop is used when.....

a. The repetition depends on a condition
b. The number of repetitions is unknown
c. We want to run the code only once
d. The number of repetitions is known

2 Put (✓) or (×):

1 The computer internally deals with data in the form of 0s and 1s. ( )

2 Complex encryption relies on long keys and mathematical equations. ( )

3 The XOR operation results in 1 only when the two values are the same. ( )

4 Anyone can read encrypted text easily without the encryption key.( )

5 The maximum value (Max) is the smallest value in the data. ( )

6 df.corr() helps to know the relationship between different subjects. ( )

7 An if-statement can execute more than one line inside it. ( )

8 The for loop is suitable when you know the number of repetitions in advance. ( )

Model Exam 5

1 Choose the correct answer:

1 The ord () function in Python is used to: .....

a. Convert text to random numbers

b. Convert a character to its Unicode number

c. Convert text to a list

d. Convert a number to a character

2 A Bit is.....

a. The largest unit of data

b. A complex electrical circuit

c. The smallest storage unit representing 0 or 1

d. A decimal number

3 Decryption by shifting is done through .....

a. adding the encryption key

b. subtracting the key from the encrypted character's number

c. deleting the first character

d. swapping letters automatically

4 What is meant by Plaintext?

a. The encrypted text

b. Unreadable text

c. The original clear text

d. Text protected by a key

5 What is the purpose of conditional statements in Python?

a. To repeat code only.

b. To execute specific code when a condition is met.

c. To define functions.

d. To create variables.

6 What is the function of the following code: grades.max() ?.....

a. Finds the lowest grade
b. Finds the highest-grade
c. Calculates the total grades
d. Counts the number of students

7 Secret key used in encryption must.....

a. Change in every step
b. Be the same in both encryption and decryption operations
c. Not be used in decryption
d. Be a letter only

2 Put (✓) or (×):

1 Forgetting to update the condition inside a while loop may cause an infinite loop ( )
2 The chr () function converts a number into its corresponding character.( )
3 A function does not work unless it is called. ( )
4 Encryption is a way to protect information from unauthorized access. ( )
5 The arithmetic mean produces a decimal number even if the results are integers ( )
6 The grades.mean() code gives the highest grade, not the average. ( )
7 If...elif...else helps the program choose only one path for execution. ( )
8 A while loop can run without a condition. ( )

Answers

MODEL (1)

1
1 a 2 c 3 a 4 b
5 c 6 a 7 c

2
1 X 2 X 3 X 4 ✓
5 X 6 ✓ 7 ✓ 8 ✓

MODEL (2)

1
1 b 2 d 3 c 4 d
5 c 6 b 7 c

2
1 ✓ 2 ✓ 3 X 4 X
5 X 6 X 7 X 8 X

MODEL (3)

1
1 b 2 a 3 b 4 b
5 c 6 b 7 c

2
1 X 2 X 3 X 4 ✓
5 ✓ 6 X 7 X 8 ✓

MODEL (4)

1
1 d 2 c 3 a 4 d
5 c 6 c 7 d

2
1 ✓ 2 ✓ 3 X 4 X
5 X 6 ✓ 7 ✓ 8 ✓

MODEL (5)

1
1 b 2 c 3 b 4 c
5 b 6 b 7 b

2
1 ✓ 2 ✓ 3 ✓ 4 ✓
5 ✓ 6 X 7 ✓ 8 X